

wherein each of R³ and R⁴ represents a hydrogen atom, a C1-C18 hydrocarbon group, or a C2-C18 acyl group; R⁵ represents a C1-C4 hydrocarbon group; R⁶ represents a C2-C4 hydrocarbon group, provided that the number of carbon atoms contained in R⁶ is greater than that of carbon atoms contained in R⁵; p is an integer of 1 or more; and q is an integer of 0 or more; wherein the composition satisfies the following conditions: (i) solubility of the refrigerant (A) in the base oil (B) is 40 mass% or less at 40°C and 1.2 MPa; and (ii) mixture viscosity of the refrigerating oil composition is 0.1 mm²/s or more at 90°C and 2.3 MPa" (emphasis added). Egawa and Kaneko do not disclose or suggest such a composition.

As conceded in the Office Action, Egawa does not disclose a composition including a C1-C8 hydrocarbon refrigerant. *See* Office Action, page 3. Instead, Egawa envisions a composition including a polyvinyl ether lubricating oil and a hydrofluorocarbon refrigerant. *See, e.g.,* Egawa, column 4, lines 9 to 46, column 8, lines 9 to 23.

The lubricating oil of Egawa is indicated to have "... excellent compatibility with mixed hydrofluorocarbon refrigerant" *See* Egawa, column 3, lines 62 to 66. By contrast, in the composition of claim 1, the polyvinyl ether base oil and the hydrocarbon refrigerant are mutually miscible to a particular degree (e.g., "solubility of the refrigerant (A) in the base oil (B) is 40 mass% or less at 40°C and 1.2 MPa"). As discussed in the present specification, the miscibility of the refrigerant in the base oil should be as small as possible, because, to the extent that the refrigerant is dissolved in the base oil, the cooling effect is decreased. *See* present specification, page 2, line 5 to page 5, line 3.

Egawa does not disclose a composition including the combination of components recited in claim 1 or having the compatibility requirements of claim 1.

As discussed above, claim 1 requires C1-C8 hydrocarbon refrigerant and a specific polyvinyl ether base oil, while also requiring a specific solubility of the refrigerant (condition (i)) and a specific mixture viscosity of the composition (condition (ii)). In addition to failing

to disclose or suggest a composition including a C1-C8 hydrocarbon refrigerant, Egawa does not disclose or suggest a composition in which the particular polyvinyl ether base oil of claim 1 is selected, while retaining properties consistent with conditions (i) and (ii) of claim 1.

Moreover, there is nothing in Egawa that would have led a skilled artisan to control conditions (i) and (ii) of claim 1. *See, e.g.*, MPEP §2144.05.II.B (citing *In re Antonie*, 195 U.S.P.Q. 6 (C.C.P.A. 1977) (particular parameter must first be recognized as result-effective variable before determination of workable ranges can be said to be obvious variation)).

Accordingly, even if one of ordinary skill in the art would have been motivated (e.g., in view of the teachings of Kaneko), to employ a C1-C8 hydrocarbon refrigerant in the composition of Egawa, the composition of claim 1 still would not be achieved.

The Office Action asserts that it would have been obvious to replace the hydrofluorocarbon refrigerants of Egawa with the hydrocarbon refrigerants of Kaneko, because Kaneko discloses that hydrofluorocarbon refrigerants and hydrocarbon refrigerants are equivalent and interchangeable. *See* Office Action, page 3. In fact, Kaneko discloses that "[t]he refrigerant to be used in refrigerators to which the refrigerator oil composition of the present invention is applied are preferably hydrogen-containing Flon compounds such as hydrofluorocarbons and hydrochlorofluorocarbons." *See* Kaneko, column 15, lines 54 to 58. That is, Kaneko does not indicate that hydrofluorocarbon refrigerants and hydrocarbon refrigerants are equivalent and interchangeable. One of ordinary skill in the art, considering the teachings of Egawa and Kaneko would not modify the compositions of Egawa by employing refrigerants that are indicated to be non-preferred in Kaneko. As is well-settled, a prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. *See* MPEP §2141.02 (citing *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 220 USPQ 303 (Fed. Cir. 1983)).

Applicants further note that Kaneko discloses that numerous different base oils may be employed. *See, e.g., Kaneko*, column 2, lines 33 to 34. One of ordinary skill in the art would not have been led to select the particular polyvinyl ether base oil of claim 1 by the teachings of Kaneko, much less to employ such polyvinyl ether base oil in combination with a C1-C8 hydrocarbon refrigerant and control the resulting composition to have a refrigerant solubility and a specific mixture viscosity satisfying conditions (i) and (ii) of claim 1.

Applicants also direct attention to the Examples of the present specification. Comparative Example 2 of the present specification, which corresponds to Example 1 of Egawa, has a solubility of 48.5 mass%, which is outside of the range of claim 1. The longer the chain length of the alkyl group corresponding to R⁵ or R⁶ in claim 1, the higher the mutual miscibility of refrigerant and base oil becomes. Accordingly, one of ordinary skill in the art would expect that other exemplified compositions in Egawa (Examples 2-8) would also have solubilities outside of the range of claim 1.

A prima facie case of obviousness has not been made.

Applicants further note that hydrogen-containing chlorofluoro compounds such as employed in Egawa and Kaneko, are believed to aggravate global warming. Accordingly, natural-substance-based cooling media that do not raise the above problems have been reevaluated. Among such cooling media, hydrocarbon-based refrigerants have been investigated. For example, the global warming potential (GWP) of R-134a is 1300, and that of propane is 3. The use of R-134a has been prohibited in Europe since 2001. The composition of claim 1 achieves refrigeration without using harmful hydrogen-containing chlorofluoro compounds and, thus, is believed to be an important contribution to the prevention of global warming.

As explained, claim 1 would not have been rendered obvious by Egawa and Kaneko. Claims 2-9 depend from claim 1 and, thus, also would not have been rendered obvious by

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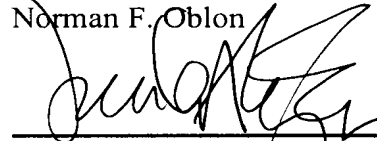
Egawa and Kaneko. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

Conclusion

For the foregoing reasons, Applicants submit that claims 1-9 are in condition for allowance. Prompt reconsideration and allowance are respectfully requested.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.
Norman F. Oblon



Jacob A. Doughty
Registration No. 46,671

Customer Number
22850

Tel: (703) 413-3000
Fax: (703) 413 -2220
(OSMMN 08/07)